

## WHAT IS CLAIMED IS:

1. A recombinant varicella-zoster virus.
2. A recombinant varicella-zoster virus of claim 1, comprising BAC vector sequence.
3. The recombinant varicella-zoster virus of claim 2, wherein at least part of the BAC vector sequence is inserted into a non-essential region of a varicella-zoster virus genome.
4. The recombinant varicella-zoster virus of claim 3, wherein the non-essential region is selected from the group consisting of the following regions:  
the region in the ORF of gene 7, the region in the ORF of gene 8, the region in the ORF of gene 9, the region in the ORF of gene 10, the region in the ORF of gene 11, the region in the ORF of gene 12, the region in the ORF of gene 13, the region in the ORF of gene 14, the region in the ORF of gene 15, the region in the ORF of gene 17, the region in the ORF of gene 18, the region in the ORF of gene 19, the region in the ORF of gene 38, the region in the ORF of gene 39, the region in the ORF of gene 46, the region in the ORF of gene 47, the region in the ORF of gene 48, the region in the ORF of gene 49, the region in the ORF of gene 50, the region in the ORF of gene 56, the region in the ORF of gene 57, the region in the ORF of gene 58, the region in the ORF of gene 59, the region in the ORF of gene 61, the region in the ORF of gene 63, the region in the ORF of gene 64, the region in the ORF of gene 65, the region in the ORF of gene 66, the region in the ORF of gene 67, the region in the ORF of gene 68, the region in the ORF of gene 69,

the region in the ORF of gene 70, the region flanking the ORF of gene 7, the region flanking the ORF of gene 8, the region flanking the ORF of gene 9, the region flanking the ORF of gene 10, the region flanking the ORF of gene 11, the region flanking the ORF of gene 12, the region flanking the ORF of gene 13, the region flanking the ORF of gene 14, the region flanking the ORF of gene 15, the region flanking the ORF of gene 17, the region flanking the ORF of gene 18, the region flanking the ORF of gene 19, the region flanking the ORF of gene 38, the region flanking the ORF of gene 39, the region flanking the ORF of gene 46, the region flanking the ORF of gene 47, the region flanking the ORF of gene 48, the region flanking the ORF of gene 49, the region flanking the ORF of gene 50, the region flanking the ORF of gene 56, the region flanking the ORF of gene 57, the region flanking the ORF of gene 58, the region flanking the ORF of gene 59, the region flanking the ORF of gene 61, the region flanking the ORF of gene 63, the region flanking the ORF of gene 64, the region flanking the ORF of gene 65, the region flanking the ORF of gene 66, the region flanking the ORF of gene 67, the region flanking the ORF of gene 68, the region flanking the ORF of gene 69, and the region flanking the ORF of gene 70.

5. The recombinant varicella-zoster virus of claim 4, wherein the non-essential region is the region flanking the ORF of gene 11, or the region flanking the ORF of gene 12.

6. The recombinant varicella-zoster virus of claim 2, wherein at least part of the BAC vector sequence is inserted into the region in the ORF of gene 62 of a varicella-zoster virus genome.

7. The recombinant varicella-zoster virus of claim 2, wherein the BAC vector sequence comprises recombinant protein dependent recombinant sequence.

8. The recombinant varicella-zoster virus of claim 2, wherein the BAC vector sequence comprises a selectable marker.

9. The recombinant varicella-zoster virus of claim 8, wherein the selectable marker is a drug selectable marker.

10. The recombinant varicella-zoster virus of claim 2, wherein the selectable marker is a gene encoding green fluorescent protein.

11. The recombinant varicella-zoster virus of claim 2, wherein the varicella-zoster virus genome is derived from a wild type strain.

12. The recombinant varicella-zoster virus of claim 2, wherein the varicella-zoster virus genome is derived from a mutant type strain.

13. The recombinant varicella-zoster virus of claim 2, wherein the varicella-zoster virus genome is derived from Oka vaccine strain.

14. The recombinant varicella-zoster virus of claim 2, wherein the varicella-zoster virus genome have mutations in gene 62 and gene 6.

15. The recombinant varicella-zoster virus of claim 14, wherein the gene 62 comprises at least the base substitutions of the following (a)-(d) in SEQ ID NO. 5:

(a) base substitution at position 2110 for G;  
(b) base substitution at position 3100 for G;  
(c) base substitution at position 3818 for C; and  
(d) base substitution at position 4006 for G,  
and, the gene 6 comprises at least a base substitution at  
position 5745 for G, in SEQ ID NO. 8.

16. The recombinant varicella-zoster virus of claim 2,  
wherein the BAC vector sequence comprises the sequence set  
forth in SEQ ID NO.: 7.

17. A pharmaceutical composition comprising the virus of  
claim 1.

18. The pharmaceutical composition of claim 17, wherein the  
composition is in the form of a vaccine.

19. A vector comprising a varicella-zoster virus essential  
gene and a BAC vector sequence other than the gene 62.

20. The vector of claim 19, further comprising the gene 62.

21. The vector of claim 19, wherein a mammalian cell produces  
a varicella-zoster virus when the vector is introduced into  
the mammalian cell.

22. The vector of claim 19, wherein a portion where a sequence  
derived from the varicella-zoster virus genome is linked  
to the BAC vector sequence is within a non-essential region  
of the varicella-zoster virus genome.

23. The vector of claim 22, wherein the non-essential region is selected from the group consisting of the following regions of:

the region in the ORF of gene 7, the region in the ORF of gene 8, the region in the ORF of gene 9, the region in the ORF of gene 10, the region in the ORF of gene 11, the region in the ORF of gene 12, the region in the ORF of gene 13, the region in the ORF of gene 14, the region in the ORF of gene 15, the region in the ORF of gene 17, the region in the ORF of gene 18, the region in the ORF of gene 19, the region in the ORF of gene 38, the region in the ORF of gene 39, the region in the ORF of gene 46, the region in the ORF of gene 47, the region in the ORF of gene 48, the region in the ORF of gene 49, the region in the ORF of gene 50, the region in the ORF of gene 56, the region in the ORF of gene 57, the region in the ORF of gene 58, the region in the ORF of gene 59, the region in the ORF of gene 61, the region in the ORF of gene 63, the region in the ORF of gene 64, the region in the ORF of gene 65, the region in the ORF of gene 66, the region in the ORF of gene 67, the region in the ORF of gene 68, the region in the ORF of gene 69, the region in the ORF of gene 70, the region flanking the ORF of gene 7, the region flanking the ORF of gene 8, the region flanking the ORF of gene 9, the region flanking the ORF of gene 10, the region flanking the ORF of gene 11, the region flanking the ORF of gene 12, the region flanking the ORF of gene 13, the region flanking the ORF of gene 14, the region flanking the ORF of gene 15, the region flanking the ORF of gene 17, the region flanking the ORF of gene 18, the region flanking the ORF of gene 19, the region flanking the ORF of gene 38, the region flanking the ORF of gene 39, the region flanking the ORF of gene 46, the region flanking the ORF of gene 47, the region flanking the ORF of gene 48, the

region flanking the ORF of gene 49, the region flanking the ORF of gene 50, the region flanking the ORF of gene 56, the region flanking the ORF of gene 57, the region flanking the ORF of gene 58, the region flanking the ORF of gene 59, the region flanking the ORF of gene 61, the region flanking the ORF of gene 63, the region flanking the ORF of gene 64, the region flanking the ORF of gene 65, the region flanking the ORF of gene 66, the region flanking the ORF of gene 67, the region flanking the ORF of gene 68, the region flanking the ORF of gene 69, the region flanking the ORF of gene 70.

24. The vector of claim 23, wherein the portion for linking is the region flanking the ORF of gene 11 and the region flanking the ORF of gene 12.

25. The vector of claim 19, wherein a portion where a sequence derived from the varicella-zoster virus genome is linked to the BAC vector sequence is in the ORF of gene 62 of the varicella-zoster virus genome.

26. The vector of claim 19, wherein the BAC vector sequence comprises recombinant protein dependent recombinant sequence.

27. The vector of claim 19, wherein the BAC vector sequence comprises a selectable marker.

28. The vector of claim 27, wherein the selectable marker is a drug selectable marker.

29. The vector of claim 27, wherein the selectable marker is a gene encoding green fluorescent protein.

30. The vector of claim 19, wherein the varicella-zoster virus genome is derived from a wild type strain.

31. The vector of claim 19, wherein the varicella-zoster virus genome is derived from a mutant type strain.

32. The vector of claim 19, wherein the varicella-zoster virus genome is derived from Oka vaccine strain.

33. The vector of claim 19, wherein the varicella-zoster virus genome have mutations in gene 62 and gene 6.

34. The vector of claim 33, wherein the gene 62 comprises at least the base substitutions of the following (a)-(d) in SEQ ID NO. 5:

(a) base substitution at position 2110 for G;

(b) base substitution at position 3100 for G;

(c) base substitution at position 3818 for C; and

(d) base substitution at position 4006 for G,

and, the gene 6 comprises at least a base substitution at position 5745 for G, in SEQ ID NO. 8.

35. The vector of claim 19, wherein the BAC vector sequence comprises the sequence set forth in SEQ ID NO.: 7.

36. A cell comprising the vector of claim 19.

37. The cell of claim 36, wherein the cell is a bacterial cell.

38. The bacterial cell of claim 37, wherein the bacterial cell is *E. coli*.

39. The cell of claim 36, wherein the cell is a mammalian cell.

40. The mammalian cell of claim 39, wherein the mammalian cell is derived from human.

41. A virus produced by the mammalian cell of claim 39.

42. A pharmaceutical composition comprising the virus of claim 41.

43. The pharmaceutical composition of claim 42, wherein the composition is in the form of a vaccine.

44. A method to produce recombinant varicella-zoster virus, comprising:

introducing a vector comprising a varicella-zoster virus genome essential gene other than gene 62 and BAC vector sequence into a mammalian host cell; and

culturing the mammalian host cell to produce recombinant varicella-zoster virus.

45. The method of claim 43, wherein the vector further comprises the gene 62.

46. The method of claim 44, wherein the mammalian host cell is derived from human.

47. The method of claim 44, wherein the BAC vector sequence comprises at least two recombinant protein dependent recombinant sequences.



48. The method of claim 47, further comprising a step of recombination between the two recombinant protein dependent recombinant sequences.

49. The method of claim 44, wherein a portion where a sequence derived from the varicella-zoster virus genome is linked to the BAC vector sequence is within a non-essential region of the varicella-zoster virus genome.

50. The method of claim 49, wherein the non-essential region is selected from the group consisting of the following regions of:

the region in the ORF of gene 7, the region in the ORF of gene 8, the region in the ORF of gene 9, the region in the ORF of gene 10, the region in the ORF of gene 11, the region in the ORF of gene 12, the region in the ORF of gene 13, the region in the ORF of gene 14, the region in the ORF of gene 15, the region in the ORF of gene 17, the region in the ORF of gene 18, the region in the ORF of gene 19, the region in the ORF of gene 38, the region in the ORF of gene 39, the region in the ORF of gene 46, the region in the ORF of gene 47, the region in the ORF of gene 48, the region in the ORF of gene 49, the region in the ORF of gene 50, the region in the ORF of gene 56, the region in the ORF of gene 57, the region in the ORF of gene 58, the region in the ORF of gene 59, the region in the ORF of gene 61, the region in the ORF of gene 63, the region in the ORF of gene 64, the region in the ORF of gene 65, the region in the ORF of gene 66, the region in the ORF of gene 67, the region in the ORF of gene 68, the region in the ORF of gene 69, the region in the ORF of gene 70, the region flanking the ORF of gene 7, the region flanking the ORF of gene 8, the region flanking the ORF of gene 9, the region flanking the

ORF of gene 10, the region flanking the ORF of gene 11, the region flanking the ORF of gene 12, the region flanking the ORF of gene 13, the region flanking the ORF of gene 14, the region flanking the ORF of gene 15, the region flanking the ORF of gene 17, the region flanking the ORF of gene 18, the region flanking the ORF of gene 19, the region flanking the ORF of gene 38, the region flanking the ORF of gene 39, the region flanking the ORF of gene 46, the region flanking the ORF of gene 47, the region flanking the ORF of gene 48, the region flanking the ORF of gene 49, the region flanking the ORF of gene 50, the region flanking the ORF of gene 56, the region flanking the ORF of gene 57, the region flanking the ORF of gene 58, the region flanking the ORF of gene 59, the region flanking the ORF of gene 61, the region flanking the ORF of gene 63, the region flanking the ORF of gene 64, the region flanking the ORF of gene 65, the region flanking the ORF of gene 66, the region flanking the ORF of gene 67, the region flanking the ORF of gene 68, the region flanking the ORF of gene 69, the region flanking the ORF of gene 70.

51. The vector of claim 50, wherein the portion which is linked is the region flanking the ORF of gene 11 or the region flanking the ORF of gene 12.

52. The vector of claim 44, wherein a portion where a sequence derived from the varicella-zoster virus genome is linked to the BAC vector sequence is in the ORF of gene 62 of the varicella-zoster virus genome.

53. The method of claim 44, wherein the BAC vector sequence comprises recombinant protein dependent recombinant sequence.

54. The method of claim 44, wherein the BAC vector sequence comprises a selectable marker.

55. The method of claim 54, wherein the selectable marker is a drug selectable marker.

56. The method of claim 54, wherein the selectable marker is a gene encoding green fluorescent protein.

57. The method of claim 44, wherein the varicella-zoster virus genome is derived from a wild type strain.

58. The method of claim 44, wherein the varicella-zoster virus genome is derived from a mutant type strain.

59. The method of claim 44, wherein the varicella-zoster virus genome is derived from Oka vaccine strain.

60. The method of claim 44, wherein the varicella-zoster virus genome has mutations in gene 62 and gene 6.

61. The method of claim 60, wherein the gene 62 comprises at least the base substitutions of the following (a)-(d) in SEQ ID NO. 5:

(a) base substitution at position 2110 for G;

(b) base substitution at position 3100 for G;

(c) base substitution at position 3818 for C; and

(d) base substitution at position 4006 for G,

and, the gene 6 comprises at least a base substitution at position 5745 for G, in SEQ ID NO. 8.

62. The method of claim 44, wherein the BAC vector sequence comprises the sequence set forth in SEQ ID NO.: 7.

63. A virus produced by the method of claim 44.

64. A pharmaceutical composition comprising the virus of claim 63.

65. The pharmaceutical composition of claim 64, wherein the composition is in the form of a vaccine.

66. A method to introduce a mutation into the vector of claim 19, comprising:

introducing the vector into a bacterial host cell;

introducing a plasmid vector comprising a fragment consisting of a portion of varicella-zoster virus genome into the bacterial host cell, wherein the fragment has at least one mutation;

culturing the bacterial host cell;

isolating a vector having BAC sequence from the cultured bacterial host cell.

67. A method to introduce a mutation into the vector of claim 19, comprising:

introducing the vector into a bacterial host cell;

introducing a first plasmid vector comprising a first fragment consisting of a portion of varicella-zoster virus genome into the bacterial host cell, wherein the first fragment has at least one mutation;

introducing a second plasmid vector comprising a second fragment consisting of a portion of varicella-zoster virus genome into the bacterial host cell, wherein the second fragment has at least one mutation, and the first fragment is different from the second fragment;

culturing the bacterial host cell;

isolating a vector having BAC sequence from the cultured bacterial host cell.

68. A nucleic acid cassette comprising a first fragment which can recombine with varicella-zoster virus genome in a bacterial cell, BAC vector sequence, and a second fragment which can recombine with varicella-zoster virus genome in a bacterial cell,

wherein the both ends of the BAC sequence are linked to the first and the second fragment, respectively.

69. The nucleic acid cassette of claim 68, wherein the first fragment and the second fragment are at least 1kb.

70. The nucleic acid cassette of claim 68, wherein the first fragment and the second fragment are at least 1.5kb.

71. The nucleic acid cassette of claim 68, wherein the first fragment and the second fragment are at least 2kb.

72. The nucleic acid cassette of claim 68, wherein the first fragment and the second fragment are at least 80% identical with a varicella-zoster virus genome sequence.

73. The nucleic acid cassette of claim 68, wherein the first fragment and the second fragment are at least 85% identical with a varicella-zoster virus genome sequence.

74. The nucleic acid cassette of claim 68, wherein the first fragment and the second fragment are at least 90% identical with a varicella-zoster virus genome sequence.

75. The nucleic acid cassette of claim 68, wherein the first fragment and the second fragment are at least 95% identical with a varicella-zoster virus genome sequence.

76. The nucleic acid cassette of claim 68, wherein each of the first fragment and the second fragment are independently selected from the group consisting of the following regions of varicella-zoster virus genome:

the region in the ORF of gene 7, the region in the ORF of gene 8, the region in the ORF of gene 9, the region in the ORF of gene 10, the region in the ORF of gene 11, the region in the ORF of gene 12, the region in the ORF of gene 13, the region in the ORF of gene 14, the region in the ORF of gene 15, the region in the ORF of gene 17, the region in the ORF of gene 18, the region in the ORF of gene 19, the region in the ORF of gene 38, the region in the ORF of gene 39, the region in the ORF of gene 46, the region in the ORF of gene 47, the region in the ORF of gene 48, the region in the ORF of gene 49, the region in the ORF of gene 50, the region in the ORF of gene 56, the region in the ORF of gene 57, the region in the ORF of gene 58, the region in the ORF of gene 59, the region in the ORF of gene 61, the region in the ORF of gene 62, the region in the ORF of gene 63, the region in the ORF of gene 64, the region in the ORF of gene 65, the region in the ORF of gene 66, the region in the ORF of gene 67, the region in the ORF of gene 68, the region in the ORF of gene 69, the region in the ORF of gene 70, the region flanking the ORF of gene 7, the region flanking the ORF of gene 8, the region flanking the ORF of gene 9, the region flanking the ORF of gene 10, the region flanking the ORF of gene 11, the region flanking the ORF of gene 12, the region flanking the ORF of gene 13, the region flanking the ORF of gene 14, the region flanking the ORF

of gene 15, the region flanking the ORF of gene 17, the region flanking the ORF of gene 18, the region flanking the ORF of gene 19, the region flanking the ORF of gene 38, the region flanking the ORF of gene 39, the region flanking the ORF of gene 46, the region flanking the ORF of gene 47, the region flanking the ORF of gene 48, the region flanking the ORF of gene 49, the region flanking the ORF of gene 50, the region flanking the ORF of gene 56, the region flanking the ORF of gene 57, the region flanking the ORF of gene 58, the region flanking the ORF of gene 59, the region flanking the ORF of gene 61, the region flanking the ORF of gene 62, the region flanking the ORF of gene 63, the region flanking the ORF of gene 64, the region flanking the ORF of gene 65, the region flanking the ORF of gene 66, the region flanking the ORF of gene 67, the region flanking the ORF of gene 68, the region flanking the ORF of gene 69, the region flanking the ORF of gene 70.

77. The nucleic acid cassette of claim 68, wherein each of the first fragment and the second fragment is independently at least 80% identical with the region selected from the group consisting of the following regions of varicella-zoster virus genome:

the region in the ORF of gene 7, the region in the ORF of gene 8, the region in the ORF of gene 9, the region in the ORF of gene 10, the region in the ORF of gene 11, the region in the ORF of gene 12, the region in the ORF of gene 13, the region in the ORF of gene 14, the region in the ORF of gene 15, the region in the ORF of gene 17, the region in the ORF of gene 18, the region in the ORF of gene 19, the region in the ORF of gene 38, the region in the ORF of gene 39, the region in the ORF of gene 46, the region in the ORF of gene 47, the region in the ORF of gene 48, the region

in the ORF of gene 49, the region in the ORF of gene 50, the region in the ORF of gene 56, the region in the ORF of gene 57, the region in the ORF of gene 58, the region in the ORF of gene 59, the region in the ORF of gene 61, the region in the ORF of gene 62, the region in the ORF of gene 63, the region in the ORF of gene 64, the region in the ORF of gene 65, the region in the ORF of gene 66, the region in the ORF of gene 67, the region in the ORF of gene 68, the region in the ORF of gene 69, the region in the ORF of gene 70, the region flanking the ORF of gene 7, the region flanking the ORF of gene 8, the region flanking the ORF of gene 9, the region flanking the ORF of gene 10, the region flanking the ORF of gene 11, the region flanking the ORF of gene 12, the region flanking the ORF of gene 13, the region flanking the ORF of gene 14, the region flanking the ORF of gene 15, the region flanking the ORF of gene 17, the region flanking the ORF of gene 18, the region flanking the ORF of gene 19, the region flanking the ORF of gene 38, the region flanking the ORF of gene 39, the region flanking the ORF of gene 46, the region flanking the ORF of gene 47, the region flanking the ORF of gene 48, the region flanking the ORF of gene 49, the region flanking the ORF of gene 50, the region flanking the ORF of gene 56, the region flanking the ORF of gene 57, the region flanking the ORF of gene 58, the region flanking the ORF of gene 59, the region flanking the ORF of gene 61, the region flanking the ORF of gene 62, the region flanking the ORF of gene 63, the region flanking the ORF of gene 64, the region flanking the ORF of gene 65, the region flanking the ORF of gene 66, the region flanking the ORF of gene 67, the region flanking the ORF of gene 68, the region flanking the ORF of gene 69, the region flanking the ORF of gene 70.



78. The nucleic acid cassette of claim 68, wherein each of the first fragment and the second fragment is independently at least 85% identical with the region selected from the group consisting of the following regions of varicella-zoster virus genome:

the region in the ORF of gene 7, the region in the ORF of gene 8, the region in the ORF of gene 9, the region in the ORF of gene 10, the region in the ORF of gene 11, the region in the ORF of gene 12, the region in the ORF of gene 13, the region in the ORF of gene 14, the region in the ORF of gene 15, the region in the ORF of gene 17, the region in the ORF of gene 18, the region in the ORF of gene 19, the region in the ORF of gene 38, the region in the ORF of gene 39, the region in the ORF of gene 46, the region in the ORF of gene 47, the region in the ORF of gene 48, the region in the ORF of gene 49, the region in the ORF of gene 50, the region in the ORF of gene 56, the region in the ORF of gene 57, the region in the ORF of gene 58, the region in the ORF of gene 59, the region in the ORF of gene 61, the region in the ORF of gene 62, the region in the ORF of gene 63, the region in the ORF of gene 64, the region in the ORF of gene 65, the region in the ORF of gene 66, the region in the ORF of gene 67, the region in the ORF of gene 68, the region in the ORF of gene 69, the region in the ORF of gene 70, the region flanking the ORF of gene 7, the region flanking the ORF of gene 8, the region flanking the ORF of gene 9, the region flanking the ORF of gene 10, the region flanking the ORF of gene 11, the region flanking the ORF of gene 12, the region flanking the ORF of gene 13, the region flanking the ORF of gene 14, the region flanking the ORF of gene 15, the region flanking the ORF of gene 17, the region flanking the ORF of gene 18, the region flanking the ORF of gene 19, the region flanking the ORF of gene 38, the region

flanking the ORF of gene 39, the region flanking the ORF of gene 46, the region flanking the ORF of gene 47, the region flanking the ORF of gene 48, the region flanking the ORF of gene 49, the region flanking the ORF of gene 50, the region flanking the ORF of gene 56, the region flanking the ORF of gene 57, the region flanking the ORF of gene 58, the region flanking the ORF of gene 59, the region flanking the ORF of gene 61, the region flanking the ORF of gene 62, the region flanking the ORF of gene 63, the region flanking the ORF of gene 64, the region flanking the ORF of gene 65, the region flanking the ORF of gene 66, the region flanking the ORF of gene 67, the region flanking the ORF of gene 68, the region flanking the ORF of gene 69, the region flanking the ORF of gene 70.

79. The nucleic acid cassette of claim 68, wherein each of the first fragment and the second fragment is independently at least 90% identical with the region selected from the group consisting of the following regions of varicella-zoster virus genome:

the region in the ORF of gene 7, the region in the ORF of gene 8, the region in the ORF of gene 9, the region in the ORF of gene 10, the region in the ORF of gene 11, the region in the ORF of gene 12, the region in the ORF of gene 13, the region in the ORF of gene 14, the region in the ORF of gene 15, the region in the ORF of gene 17, the region in the ORF of gene 18, the region in the ORF of gene 19, the region in the ORF of gene 38, the region in the ORF of gene 39, the region in the ORF of gene 46, the region in the ORF of gene 47, the region in the ORF of gene 48, the region in the ORF of gene 49, the region in the ORF of gene 50, the region in the ORF of gene 56, the region in the ORF of gene 57, the region in the ORF of gene 58, the region in

the ORF of gene 59, the region in the ORF of gene 61, the region in the ORF of gene 62, the region in the ORF of gene 63, the region in the ORF of gene 64, the region in the ORF of gene 65, the region in the ORF of gene 66, the region in the ORF of gene 67, the region in the ORF of gene 68, the region in the ORF of gene 69, the region in the ORF of gene 70, the region flanking the ORF of gene 7, the region flanking the ORF of gene 8, the region flanking the ORF of gene 9, the region flanking the ORF of gene 10, the region flanking the ORF of gene 11, the region flanking the ORF of gene 12, the region flanking the ORF of gene 13, the region flanking the ORF of gene 14, the region flanking the ORF of gene 15, the region flanking the ORF of gene 17, the region flanking the ORF of gene 18, the region flanking the ORF of gene 19, the region flanking the ORF of gene 38, the region flanking the ORF of gene 39, the region flanking the ORF of gene 46, the region flanking the ORF of gene 47, the region flanking the ORF of gene 48, the region flanking the ORF of gene 49, the region flanking the ORF of gene 50, the region flanking the ORF of gene 56, the region flanking the ORF of gene 57, the region flanking the ORF of gene 58, the region flanking the ORF of gene 59, the region flanking the ORF of gene 61, the region flanking the ORF of gene 62, the region flanking the ORF of gene 63, the region flanking the ORF of gene 64, the region flanking the ORF of gene 65, the region flanking the ORF of gene 66, the region flanking the ORF of gene 67, the region flanking the ORF of gene 68, the region flanking the ORF of gene 69, the region flanking the ORF of gene 70.

80. The nucleic acid cassette of claim 68, wherein each of the first fragment and the second fragment is independently at least 95% identical with the region selected from the

group consisting of the following regions of varicella-zoster virus genome:

the region in the ORF of gene 7, the region in the ORF of gene 8, the region in the ORF of gene 9, the region in the ORF of gene 10, the region in the ORF of gene 11, the region in the ORF of gene 12, the region in the ORF of gene 13, the region in the ORF of gene 14, the region in the ORF of gene 15, the region in the ORF of gene 17, the region in the ORF of gene 18, the region in the ORF of gene 19, the region in the ORF of gene 38, the region in the ORF of gene 39, the region in the ORF of gene 46, the region in the ORF of gene 47, the region in the ORF of gene 48, the region in the ORF of gene 49, the region in the ORF of gene 50, the region in the ORF of gene 56, the region in the ORF of gene 57, the region in the ORF of gene 58, the region in the ORF of gene 59, the region in the ORF of gene 61, the region in the ORF of gene 62, the region in the ORF of gene 63, the region in the ORF of gene 64, the region in the ORF of gene 65, the region in the ORF of gene 66, the region in the ORF of gene 67, the region in the ORF of gene 68, the region in the ORF of gene 69, the region in the ORF of gene 70, the region flanking the ORF of gene 7, the region flanking the ORF of gene 8, the region flanking the ORF of gene 9, the region flanking the ORF of gene 10, the region flanking the ORF of gene 11, the region flanking the ORF of gene 12, the region flanking the ORF of gene 13, the region flanking the ORF of gene 14, the region flanking the ORF of gene 15, the region flanking the ORF of gene 17, the region flanking the ORF of gene 18, the region flanking the ORF of gene 19, the region flanking the ORF of gene 38, the region flanking the ORF of gene 39, the region flanking the ORF of gene 46, the region flanking the ORF of gene 47, the region flanking the ORF of gene 48, the region flanking the ORF

of gene 49, the region flanking the ORF of gene 50, the region flanking the ORF of gene 56, the region flanking the ORF of gene 57, the region flanking the ORF of gene 58, the region flanking the ORF of gene 59, the region flanking the ORF of gene 61, the region flanking the ORF of gene 62, the region flanking the ORF of gene 63, the region flanking the ORF of gene 64, the region flanking the ORF of gene 65, the region flanking the ORF of gene 66, the region flanking the ORF of gene 67, the region flanking the ORF of gene 68, the region flanking the ORF of gene 69, the region flanking the ORF of gene 70.

81. The nucleic acid cassette of claim 68, wherein the first fragment and the second fragment are derived from different regions.

82. The nucleic acid cassette of claim 72, wherein each of the first fragment and the second fragment are independently from the region flanking the ORF of gene 11 or the region flanking the ORF of gene 12.

83. The nucleic acid cassette of claim 68, wherein the BAC vector sequence comprises recombinant protein dependent recombinant sequence.

84. The nucleic acid cassette of claim 68, wherein the BAC vector sequence comprises a selectable marker.

85. The nucleic acid cassette of claim 84, wherein the selectable marker is a drug selectable marker.

86. The nucleic acid cassette of claim 68, wherein the selectable marker is a gene encoding green fluorescent protein.

87. The nucleic acid cassette of claim 68, wherein the varicella-zoster virus genome is derived from a wild type strain.

88. The nucleic acid cassette of claim 68, wherein the varicella-zoster virus genome is derived from a mutant type strain.

89. The nucleic acid cassette of claim 68, wherein the varicella-zoster virus genome is derived from Oka vaccine strain.

90. The nucleic acid cassette of claim 68, wherein the BAC vector sequence comprises the sequence set forth in SEQ ID NO.: 7.

91. The nucleic acid cassette of claim 68, having a nucleic acid sequence set forth in SEQ ID NO.: 2.